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ANNUAL REPORT

Fiscal Year July 2001—June 2002

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Utah!
Where ideas connect™

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2001-2002 Centers of Excellence Annual Report

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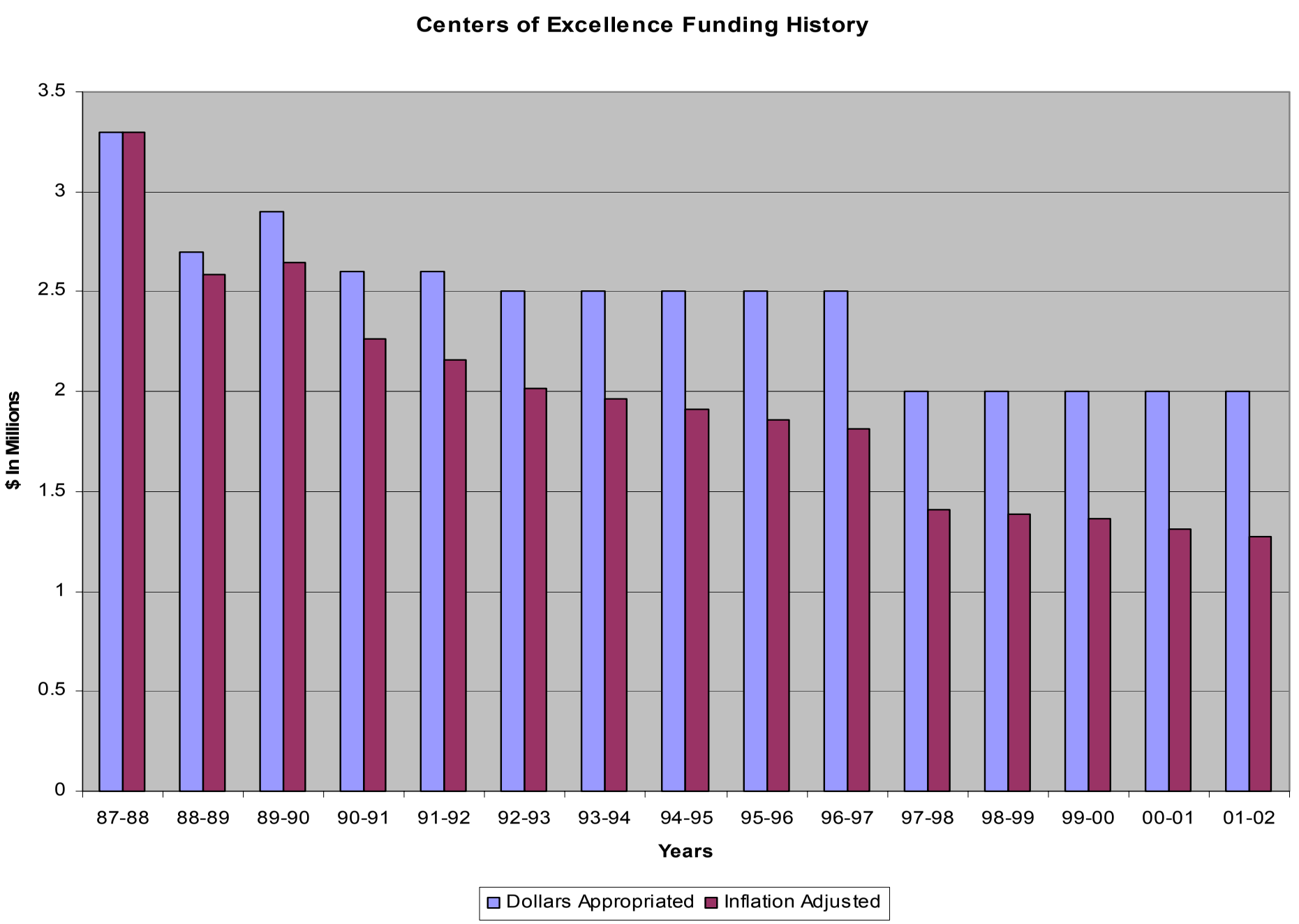

Centers of Excellence Funding History
$ In Millions
3.5
3
2.5
2
1.5
1
0.5
0
87-88
88-89
89-90
90-91
91-92
92-93
93-94
94-95
95-96
96-97
97-98
98-99
99-00
00-01
01-02
Years
Dollars Appropriated
Inflation Adjusted

Executive Summary

Utah enjoys a rich and diverse legacy of technical innovation, ranging from the invention of television (by Philo Farnsworth, in 1927) to innumerable advances in the fields of computing and medicine during more recent decades. Unfortunately, many of these inventions went on to be commercialized elsewhere, robbing the state of the jobs, revenues and respect that it was rightfully due. The Utah State Legislature established the Centers of Excellence Program (COEP) in 1986 as part of a strategy to improve on that record. They approved the annual allocation of economic development funds, to be awarded to university faculty members on a competitive basis through the COEP, specifically to fund what federal grants from agencies like the National Science Foundation do not support: Highly targeted, market-driven projects that perform the applied research, prototype development and business planning necessary to successfully commercialize promising technical innovations here in Utah.

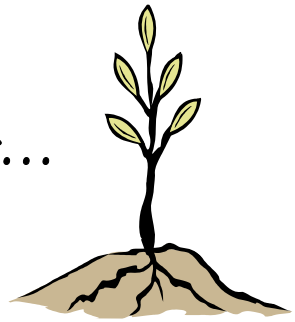
COEP projects require a 2:1 match with non-state funds, and are subject to an annual competitive renewal for up to five years of support. Over time, an Advisory Council composed of veteran technology executives has been formed to assist in reviewing and choosing the projects to be funded, and a requirement has been added that Centers work with independent, preapproved Commercialization Consultants to insure that projects remain commercially focused. As a result of this disciplined structure, the Utah Centers of Excellence Program continues to be one of the nations most successful technology commercialization programs as measured by matching dollars, new companies, new products, and state economic impact. During the last year, the program director has been interviewed by representatives of agencies hailing from Rhode Island to Romania.

During the 2001-2002 fiscal year the Centers Program issued $1.87 million in grants to 16 active Centers for use in bringing significant new technologies closer to the marketplace. In the competitive selection process, three centers were graduated, 13 centers received continued funding and 3 new centers were selected. The Center distribution was as follows: nine at the University of Utah ($1,090,000), three at Utah State University ($330,000), three at Brigham Young University ($380,000), and one at Weber State University ($68,000). In addition, the program also funded two Planning Grants and the commercialization consulting effort, at a level of $7,000 per funded Center, for a total of $2.0 million.

The 16 Centers received matching funds of $20.5 million, resulting in a matching fund ratio of 11:1, and (despite the recession) spun out eight new Utah companies. Over the first 16 years of the program, the Centers of Excellence have generated 179 patents, resulting in 204 license agreements, and 150 Utah-based companies have been created to license and market proprietary technology from the program. As of the last audit (2001), those companies directly employed over 1300 persons in the state, at an average wage of $68,000. With some earlier graduates of the program (Myriad Genetics, Inc. and Sonic Innovations, Inc., for example) just beginning to mature as significant, publicly held companies and scores of others developing and growing, it is clear that the entrepreneurial pipeline laid by the COEP will have an ever expanding and progressively more important role to play in Utah's economic future.

Success Stories

Acorns, Seedlings, Saplings, Oaks…



The Centers of Excellence have spawned over 150 Utah companies to date – 8 in the last fiscal year alone. From tiny startups to maturing, publicly held corporations with hundreds of employees, the commercial offspring of this incubator program form a growing pipeline that today provides exciting, well-paid jobs for recent grads and seasoned workers alike. The following pages illustrate just a few examples of spinout companies that are applying revolutionary technologies to create new jobs, new wealth, and new worldwide recognition for the achievements of Utahns.

Acorns, Seedlings, Saplings, Oaks…

IsoTruss Structures

The woman shown below is smiling because the 47 foot-long pole on her shoulder weighs only 23 pounds, but could support the weight of her car. Now, how about a bicycle frame stronger than steel but weighing only 2 pounds? These are the sort of achievements made possible by the work of Prof. David Jensen at BYU's Center for Advanced Structural Composites, and licensed to 2002 startup company IsoTruss Structures, Inc., in Heber City.

The U.S. Department of Energy has awarded an SBIR grant to the firm, which proposed to demonstrate how their lightweight girders could replace the steel towers that support 1.5 megawatt wind turbines today. Those turbines are over 200 feet tall, and the towers supporting the 250,000 pound load weigh over 300,000 pounds themselves. The proposed IsoTruss tower will weigh only 10,000 pounds, have the same load-bearing capacity and cost far less to transport and install.

The company's first product, however, is more prosaic – but indicative of the enormous potential markets for their technology. Priced at $325.00, the IsoTruss 'C' class 40 foot long utility pole weighs only 174 pounds, features both greater strength and higher wind resistance than wood poles, contains no poisonous preservatives, and carries a 100 year warranty.

Professor David Jensen, BYU holding an IsoTruss structure.

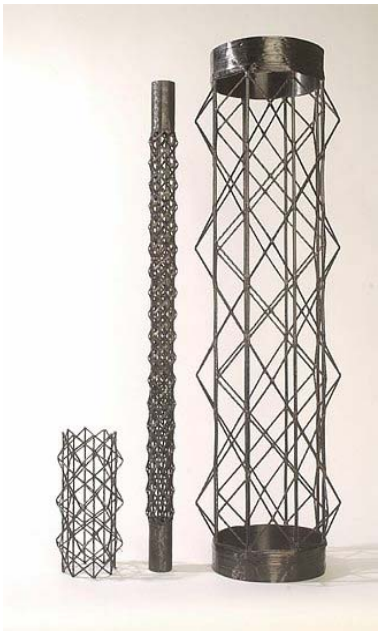
IsoTruss Structures, Inc., headquartered in Heber City, Utah, manufactures and sells a revolutionary new material technology that delivers products which have significantly higher strength-to-weight and stiffness-to-weight ratios than common structural forms based on conventional materials such as steel, iron, aluminum, wood, etc. IsoTruss manufactures custom products that meet client specific end-use requirements both as replacement products as well as completely new and unique solutions where designers and engineers have not been limited by conventional materials.

Center for Advanced Structural Composites

The primary efforts of CASC are focused on the investigating, developing, and testing of advanced structural composites as well as the licensing of patented technologies, such as the IsoTruss. The IsoTruss is a revolutionary, patented (U.S. Patent #5,921,048), lightweight, three-dimensional structural form that takes advantage of the highly directional properties of advanced composite materials. This extremely efficient structure has the potential to enhance innumerable applications ranging from aerospace structures to mechanical systems to sporting equipment to civil infrastructure.

www.isotruss.com

IsoTruss Structures, Inc., is a composite technology company that develops, manufactures and distributes a superior composite structure ("IsoTruss") designed to leverage the weight and performance advantages of fiberglass and carbon composites at costs significantly lower than traditional composite methods. In many applications, the patented structural geometry of IsoTruss provides a superior structural solution that is lighter, stronger and more efficient than traditional composites, metals and wood.



The patented technology behind IsoTruss is the result of over six years and $3 million dollars in research. The Company has made significant progress in commercializing the IsoTruss technology by simplifying the product design process, developing cost efficient methods of manufacturing, identifying targeted vertical markets for the IsoTruss product and implementing strategies to penetrate those markets.

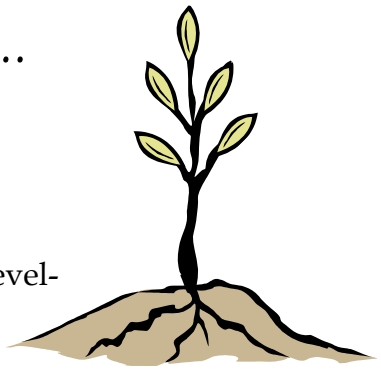
IsoTruss is the world's first advanced composite structure configured in a lattice geometry for superior strength. This makes IsoTruss the lightest, strongest, most efficient structure available. IsoTruss is 91 percent lighter than steel and 76 percent lighter than aluminum.

IsoTruss Structures, Inc. has the exclusive United States license to commercialize the IsoTruss technology.

The technology was developed by David W. Jensen, professor of civil engineering, at BYU's Center for Advanced Structural Composites, part of the state of Utah's Centers of Excellence program. Twelve of Jensen's graduate students have studied the IsoTruss for their master's theses, and about a dozen undergraduates also contributed to its development.

The company has received an SBIR Phase 1 award from the Department of Energy for the development of much taller, lighter weight and lower cost Wind turbine towers to generate electricity using IsoTruss ™ technology. Under the $100,000 IsoTruss Structures, Inc. eventually will try to build towers up to 600 feet high, or three times taller than standard steel wind turbine structures. Researchers say the new towers could generate five megawatts of power, compared with a typical 200-foot steel tower's 1.5-megawatt cap. Such a breakthrough could make wind energy cost competitive with fossil fuel produced energy.

Acorns, Seedlings, Saplings, Oaks…



uniAMS

When Samsung, the giant Korean firm, saw the technology developed by Prof. Hosin Lee in the U of U's Center for Advanced Construction Materials, they liked it – so much so that they partnered with the team to create uniAMS, an operating unit of Samsung SDS America (SDSA), and base it in downtown Salt Lake City, where their dozen employees now occupy the 12th floor of the Key Bank building.

Targeted primarily at government transportation authorities, the uniPAVEMENT and uniSURVEY products incorporate state-of-the-art digital image processing technology and user-friendly software to provide civil engineers with objective, cost-effective and facile methods for budgeting, optimizing and scheduling road asset maintenance and repair strategies. Best of all, they can provide the capability of a competing $500,000 product for under $25,000 – and it is easier to use.

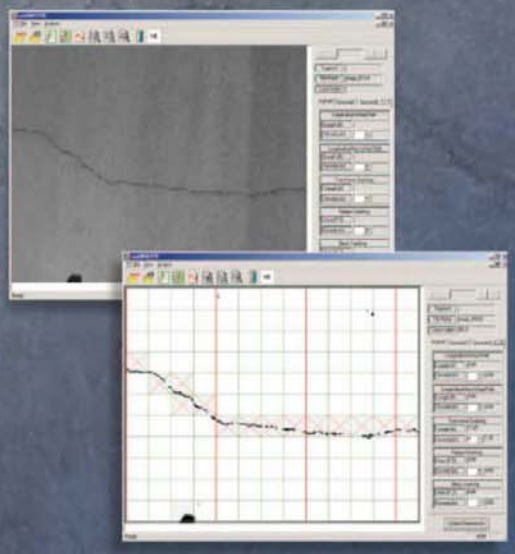
With customers in a number of states and countries and the ability to expand into other types of asset management markets, uniAMS is now beginning to get traction and grow. Dr. Lee notes that "Bringing SDSA to Utah is an example of successful technology transfer from academia to industry with support from the government. This success was only possible because of an initial seed grant from the Centers of Excellence Program at the Utah Department of Community and Economic Development to the University of Utah."

www.uniams.com

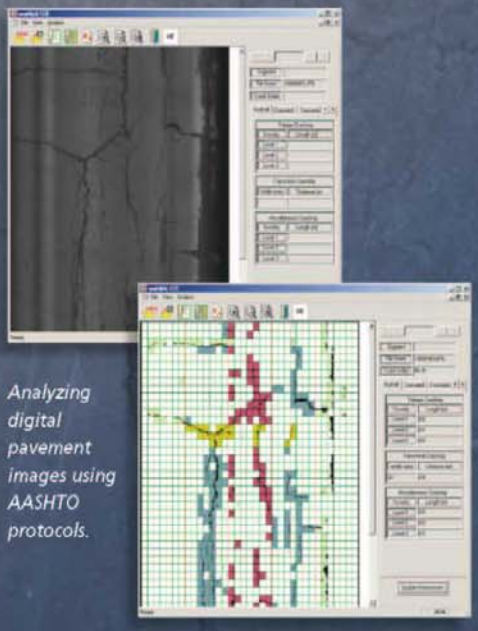
uniSurvey

Better Technology for Better Roads

uniSURVEY is road inventory & condition data surveying and distress measurement software. uniSURVEY uses a state-of-the-art digital image processing technology to analyze pictures of various types of pavement surfaces. By integrating with GIS systems, uniAMS helps city engineers schedule pavement, bridge, sign, and sidewalk condition & inventory surveys. uniSURVEY is able to accept pavement condition data, process that data, and then present images of the overall pavement condition on a color-coded digital map. The collection rules and survey routes are easily definable. uniSURVEY provides city engineers with objective, cost-effective and easy-to-use methods for optimizing and scheduling road asset maintenance and repair strategies.



Computing SHRP crack type, extent, and severity.



Analyzing digital pavement images using AASHTO protocols.

Features

- **Flexible configuration** for distress and inventory tracking.
- **GIS-based survey.** Using interactive digital map, the survey schedule can be planned. Asset condition and inventory data is also easily accessible from the digital map.
- **Built-in Device Interface** can easily control and configure survey equipment such as DMI, GPS, and X-Keypad.

Benefits

- Data collection process produces higher quality results.
- Survey results are easy to generate and easy to work with
- Increased level of objectivity of asset management systems and policies
- Streamlined integration with data collection system

uniBridge

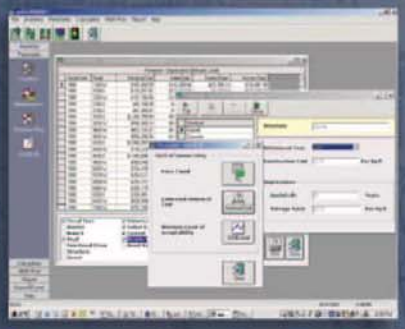
uniSidewalk

uniPavement

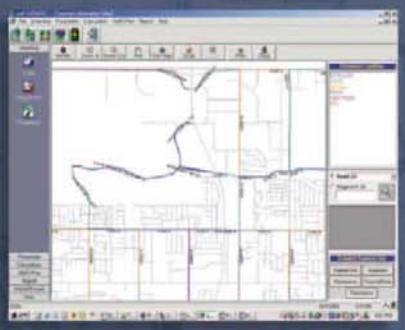
Mapping Maintenance Decisions

uniPAVEMENT is a GIS-based pavement management system that can automatically determine optimum maintenance strategies, schedule maintenance and program long-term budgets meeting new GASB 34 requirements. uniPAVEMENT helps civil engineers develop the most cost-effective pavement rehabilitation projects for various budgets scenarios. The software has been built with an emphasis on being user-friendly. Even users who are new to pavement management systems can quickly and easily master the intuitive point-and-click interface. uniPAVEMENT also provides extremely credible estimations of existing and future needs. uniPAVEMENT supplements existing local knowledge and practical experience regarding pavement data.

PDA module replaces written forms when performing inspections.



Historical data display and GASB-34 compliant documentation.



Access pavement information from database and GIS map.

Features

- **Easy to use system** with user-friendly menu navigation and screens.
- **User-configurable decision model.** Using the mouse, the user is able to define a customized decision model to process maintenance and repair strategies during budget planning.
- **Asset Value Calculator** calculates the value of an asset for GASB 34 reports automatically.
- **Simulation of multiple maintenance & repair plans** determines the best multi-year Maintenance & Repair strategies based on unlimited budget, condition driven and budget driven scenarios.
- **Section-specific deterioration model** predicts future asset condition of individual sections.

Benefits

- Provide better data to decision makers
- Generate the most cost-effective maintenance strategies
- Reduced time requirements
- Meeting GASB 34 requirements become easier

Services

Excellence from Concept to Completion

Data Collection Services

Samsung SDS America has the knowledge and tools regarding inventory, valuation, and asset condition management to assist government agencies in implementing GASB 34 standards. Samsung SDS America's roadway data collection services feature state-of-the-art automated equipment as well as refined manual methods to provide our clients with the data the need to efficiently manage their roadway infrastructure and inventory.

PROFESSIONAL SERVICES FROM SAMSUNG SDS AMERICA

- Data Collection Services
- Database Update and Conversion Services
- Installation Services
- Education Services
- Equipment Assembly Services
- GIS Map Services
  - Map creation
  - Map and data conversion
  - Map condition report
  - Map-book for data survey

Data Collection Equipment

Samsung SDS America supplies and installs the data collection equipment needed for using uniAMS. Samsung provides State of the Art integrated data collection systems including: high-speed digital cameras, differential GPS, accurate Digital Measuring Indexes, programmable key-boards, independent power sources. The uniAMS Data Collection Equipment can be mounted on to any vehicle and used for surveying immediately.

SAMSUNG SDS

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F 801.521.3381
uniAMS@usa.samsung.com
www.uniams.com

Samsung SDS America
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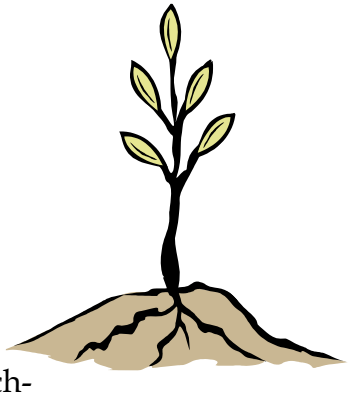
San Jose, CA 95134
T 866.321.SDSA
F 408.544.4966
sales@usa.samsung.com
www.samsungsdsa.com

SYSTEM REQUIREMENTS

CPU:	Pentium or higher
OS:	Windows 98, Me, 2000, XP
Hard Drive:	Minimum 64 MB available
Memory:	128 MB of RAM
CD ROM:	8x or higher
Monitor:	VGA minimum, SVGA recommended
Database:	Microsoft Access 2000 using ODBC, ADO

Acorns, Seedlings, Saplings, Oaks…



Applied Biosciences

The Center for Bioremediation at Weber State University is graduating early from the Centers of Excellence Program, having completed its mission of commercializing patented new technologies for cleansing waters contaminated by cyanide, selenium and other recalcitrant pollutants. One part of its legacy will be an undergraduate research laboratory that has both launched students into graduate and medical schools, and served as an inspiration for other faculty - resulting in new student research programs that have enhanced the quality of undergraduate education at WSU. The second legacy is Applied Biosciences, the spinout company that has licensed the technology and recently moved into larger quarters in Salt Lake City. From 2001 revenues of ca. $300,000, the firm has nearly doubled in the last year, despite the economic downturn, and now employs 11 people with average wages of over $40,000.

It is a notoriously long, difficult and expensive process for new technologies to gain acceptance in the remediation marketplace, which is dominated by conservative engineering firms and controlled by the Environmental Protection Agency (EPA). With the support of the Centers program, however, Prof. Jack Adams was able to demonstrate his method at full scale in an EPA-supervised, competitive evaluation for treating mine wastes. The WSU technology was not only the only one to actually achieve the EPA cleanup standard; it did so at one-tenth the cost of the existing BDAT (Best Demonstrated Available Technology, as designated by the EPA). Following official recognition as the new BDAT for selenium removal, the last hurdle for the WSU process was removed, and the pathway for the future success of Applied Biosciences was established.

The company expects to roughly double in size again in 2003, with continued rapid growth; based on current market estimates, management anticipates reaching a sales level of some $40 million by the end of this decade.

OUR MISSION is to help our customers meet strict water quality standards for metals and nitrate and to do it at the lowest possible cost. We work directly for end-user customers and with other water treatment providers to deliver complete and cost-effective treatment solutions

Applied Biosciences began in 1996 to provide innovative environmental solutions to the mining industry. Early successes with water treatment for selenium and arsenic quickly found application in other industries as well. We now provide solutions for a wide range of parameters in a variety of industries. We work closely with our end-user customers and with our engineering and water treatment partners to provide the most cost-effective water treatment systems available

Lead, South Dakota, Aug 28, 2002 – Applied Biosciences of Salt Lake City announced the continued successful operation of a new biological selenium removal plant at a gold mine in the Black Hills of South Dakota. On line since the winter of 2001, the water treatment plant at Wharf Resources in Lead has been removing selenium to below detection in a waste stream being discharged into a fresh-water creek. Selenium is naturally occurring in the Black Hills region and is common in mining run-off. Applied Biosciences worked closely with Wharf Resources personnel to design and build a treatment plant using an Applied Biosciences' biological process that would cost-effectively treat the selenium year-round. Treatment costs for the new plant have averaged $0.12 per 1000 gallons treated. Being successfully treated elsewhere on site are also arsenic and nitrate. Applied Biosciences specializes in water treatment for dissolved metals and other inorganic contaminants. For additional information contact Applied Biosciences at 800-280-7852.

SOLUTIONS

Applied Biosciences can design water treatment solutions to fit a wide variety of industries and contexts. Our team of experts in microbiology, chemistry, and engineering can solve new and complex water problems with affordable bench-scale testing and design.

TREATMENT SYSTEMS

For industries with recurring problems and similar streams, Applied Biosciences has developed proven treatment systems. Industrial process streams, mining waste streams and run-off, petroleum refinery water streams and others can be treated right away with ready-to-install designs. Systems range in complexity from low-maintenance pump-and-treat to passive, pond type systems for remote locations.

CONSULTING

Years of experience in bioremediation and water treatment are made available to Applied Biosciences' clients through consulting and customer support services.

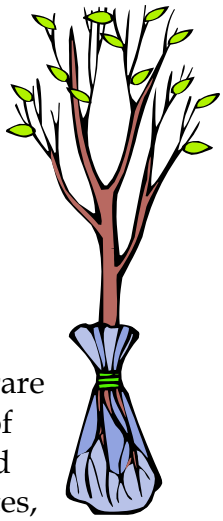
PROCESS ENGINEERING and IMPLEMENTATION

Applied Biosciences can design a solution and a system to treat any type of water stream or body. New and complex situations sometimes require new approaches and solutions. Applied Biosciences' engineers and project managers can design and implement step-by-step, from treatability testing through on-site pilot to full-scale, a cost-effective water treatment system for any variety of sites and industries.

WHY CHOOSE ABMet™?

ABMet™ solutions provide key benefits as compared to competing treatment methods: Treatment costs as low as $0.12 per 1000 gallons treated (a small fraction of the cost of conventional options). Simple system designs with low capital costs. Minimal sludge generation (100 to 1,000 times less than conventional treatment). No rejection stream. And most important, consistent treatment to below detection for target parameters

Acorns, Seedlings, Saplings, Oaks…



Echelon Biosciences

The first of three separate spin-off companies from the Center for Cell Signaling (CCS) at the University of Utah, Echelon Biosciences, Inc. has grown to 30 employees without raising a dime of investment capital – a rare achievement in the world of biotechnology firms. Building on the work of CCS Director Prof. Glenn Prestwich, the company initially developed and marketed a line of specialty reagents for use in research on cancer, diabetes, inflammation and other disorders.

With collaborations, research contracts, SBIR grants and burgeoning sales (over $1 million in 2001) fueling growth, Echelon has already out-grown its old space as the company waits to move into a new building at the Research Park (see photo), and their focus has shifted to the next phase of their corporate strategy: creating assays and finding drugs that can prevent the development and progression of diseases, including cancer and diabetes, by blocking lipid signaling pathways.

A two-time recipient of the national Tibbetts Award from the Small Business Administration, Echelon is now poised for a sustained period of growth in which new capital, new discoveries and new partnerships with leading pharmaceutical companies are expected to help forge a new flagship Utah biotechnology company from this successful spin-out.

Echelon Biosciences Inc is a unique drug discovery and development company identifying compounds as potential therapeutics that block critical lipid signaling pathways thereby preventing disease development and progression.

www.echelon-inc.com

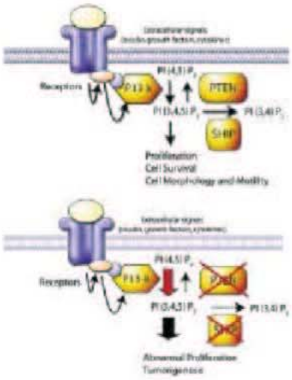
Echelon Biosciences, Inc. (EBI) is a private biotechnology company and is a leader in the field of lipid (phosphoinositide (PI) and isoprenoid) cell signaling research and product development.

Corporate Strategy

- **Phase I**: Development of a specialty product line of high quality reagents primarily intended for research in cancer, diabetes, inflammation, cardiovascular disease, and in immune disorders.
- **Phase II**: Development of high throughput assays to accelerate drug discovery in cancer, diabetes, anti-infectives and other human pathologies.
- **Phase III**: Utilize internally developed assays to discover molecules with therapeutic potential for cancer and diabetes.

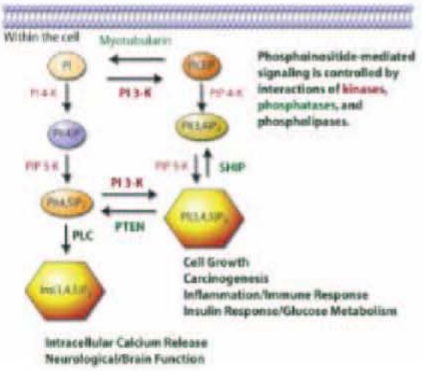
Phosphatidylinositol 3-kinase (PI3-K)

The importance of the PI3K– AKT pathway in various cancers is firmly established. Small molecules have exhibited success as kinase inhibitors in chronic myelogenous leukemia and in lung cancer. *Gleevec ™ is an example of a recently approved kinase inhibitor. EBI has identified a number of PI3K inhibitors and will target specific isoforms involved in ovarian, uterine, breast, and prostate cancer.



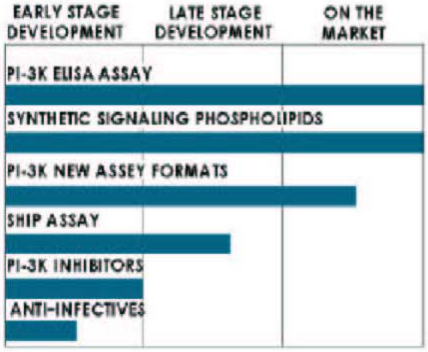
*Gleevec, imatinib mesylate is a registered trademark of Novartis Oncology

Phosphoinositide Targeting



- Phosphoinositide polyphosphates (PIPn) are key lipid second messengers in cellular signaling.
- Disruption in signaling enzymes like PI3K and SHIP2 are common in cancer, diabetes and inflammation.
- Disruptions in these enzymes are common to many disease states, including cancer, diabetes, inflammation, and disease.
- Inhibiting one or more of these enzymes (or their isoforms) may provide effective treatment of cancer, diabetes, and drug resistant infections.

Development Pipeline



Products and Opportunities

PRODUCTS

- Individual lipid signaling reagents
- Non-radioactive screening tools
- Antibodies to detect PIP_n in tissues
- Novel anti infective targets (MEP ENZYMES)

OPPORTUNITIES

- Licenses for screening tools
- Development collaborations in lipid signaling targeting
- Library screening for phosphoinositide converting enzyme inhibitors
- Enzyme isoform activity targeting
- Development of cell based assays
- Licensing opportunities for PI related technologies

Recent company news

September 2002 Echelon is awarded the national Tibbett's Award for Small Business Innovation Research

July 2002 Echelon Biosciences Inc. advances the fight against cancer with new PI-3 Kinase screening technologies

May 10, 2002 Echelon Research Laboratories, Inc. announces name change to Echelon Biosciences INC, and new president

January 2002 Echelon Research Laboratories, Inc. and ComGenex, Inc. announce a drug discovery alliance for novel inhibitors of lipid kinases and phosphatases

March 2001 NIH Awards Echelon Research Laboratories Inc. A Third Phase II SBIR Grant

Milestone Events (last 12 months)…

- Record sales of $1 million in 2001
- Alliance with ComGenex to identify leads in cancer, and inflammatory diseases.
- Release of the world's first non-radioactive PI3-Kinase assay system for drug discovery and development in cancer, diabetes, cardiovascular disease, and inflammation.

Next twelve month milestones

- Continued record revenue growth, fueled by new products.
- Tumor animal data on PI3-kinase inhibitors with ovarian cancer as target.
- Further collaborations/licenses with pharma companies for drug development.
- Expand patent portfolio

Alliances

ComGenex	Partner and combi-chem developer for compound screening
Molecular Probes	Marketing and re-distribution agreement
The University of Utah	Technology license agreement

Summary

EBI offers exciting development opportunities to participate in the rapidly expanding area of lipid cell signaling. It is a profitable and well developed company with a world class scientific and management team, proprietary and patented technology, large and compelling applications, rapidly developing collaborations, a strong customer list, and clear paths to revenues and profits. We encourage you to discover Echelon Biosciences Inc. by allowing us to tell you more about EBI's exciting future.

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FAX: 801.588.0497
ONLINE: www.echelon-inc.com

Acorns, Seedlings, Saplings, Oaks…

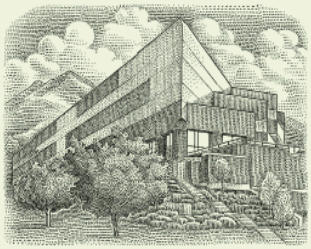
Myriad Genetics

In 1991, Prof. Mark Skolnick established the Center for Cancer Genetic Epidemiology in order to turn knowledge of the genetic causes and origins of common cancers into DNA-based diagnostic tools. By the time spin-off company Myriad Genetics, Inc. went public in late 1995, it already employed 60 people and had attracted international attention to Utah as a center of advanced knowledge and application in that field.

Today, they have in turn spun off two wholly owned subsidiaries: Myriad Pharmaceuticals, Inc., which is developing new drugs for the treatment of such diseases, and Myriad Genetic Laboratories, Inc., which develops and markets DNA diagnostics – as well as Myriad Proteomics, Inc., a joint venture with Oracle and Hitachi bent on analyzing every protein and its interactions in the human body within the next few years. The Myriad family of firms collectively employs over 500 Utahns and boasts over $50 million in annual sales. Their product range now covers breast cancer, colon cancer, endometrial cancer, melanoma and ovarian cancer. Already one of the most successful offspring of the Centers of Excellence Program, they are expected to keep growing for years to come.

Myriad Genetic Laboratories

Two product introductions during 2002 served to further our worldwide leadership position in cancer predictive medicine. Myriad's product range now covers breast cancer, ovarian cancer, colon cancer, endometrial cancer and melanoma skin cancer.



Myriad is the world leader in cancer predictive medicine. We are developing drugs to prevent and treat cancer and viral diseases to help people live longer, healthier lives.

Myriad Pharmaceuticals

At Myriad, our mission is to discover and develop a new generation of products in predictive and therapeutic medicines with a particular focus on saving lives through the prevention and treatment of cancer and viral diseases.

www.myriad.com

Myriad Genetics

Advancing Drug Discovery and Patient Care Through Genomics

Myriad Genetics Inc. is a biopharmaceutical company focused on the development of therapeutic and diagnostic products using genomic and proteomic technologies. The Company's emphasis on product development is demonstrated in its major business components:

- Therapeutic product development in important disease areas
- Identification of disease-causing genes, as potential drug targets, for major pharmaceutical company partners
- Disease pathway discovery through ProNet® and ProSpec® proteomic technologies to isolate drug targets for development
- Molecular diagnostic testing for inherited risk of disease
- Use of high-throughput DNA sequencing to reveal the genomes of important animal, plant and microbial species

Myriad has two wholly owned subsidiaries – Myriad Pharmaceuticals, Inc., which develops and intends to market therapeutic compounds, and Myriad Genetic Laboratories, Inc., which develops and markets proprietary predictive medicine products. The Company has established strategic alliances with Abbott, Bayer, DuPont, Eli Lilly, Hitachi, Pharmacia, Novartis, Oracle, Roche, Schering AG, Schering-Plough and Syngenta.

2001-2002 Funded Centers

CENTER FOR

ACOUSTIC COOLING

UNIVERSITY OF UTAH

CENTER

The Center for Acoustic Cooling Technologies has been established for the development of high frequency thermoacoustic engines for cooling applications. The Center is based on two thermoacoustic principles. The first principle is that heat can generate sound, the second is that sound can be used to pump heat. An important application for the above devices is in the heat management of computers, lap-tops, and microcircuits.

Can you imagine…..

A miniature cooling device that replaces fans in airplane cockpit displays and personal computers using sound as the main energy source and measuring from 4 cm to less than 1 cm?

ACCOMPLISHMENTS

The Center for Acoustic Cooling is structured on fundamental developments of miniature thermo-acoustic devices supported by the Office of Naval Research, the interfacing of devices to microcircuits and computers as supported by DARPA (HERETIC Program), and industrial collaboration with a local company, for the development and commercialization of Center technologies. Prototype devices have been constructed and successfully demonstrated by an independent company.

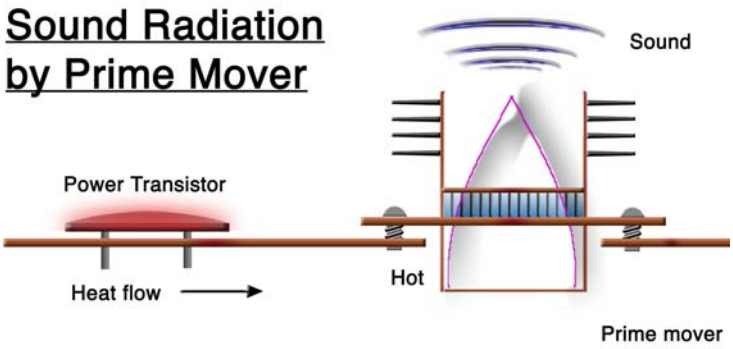
TECHNOLOGY

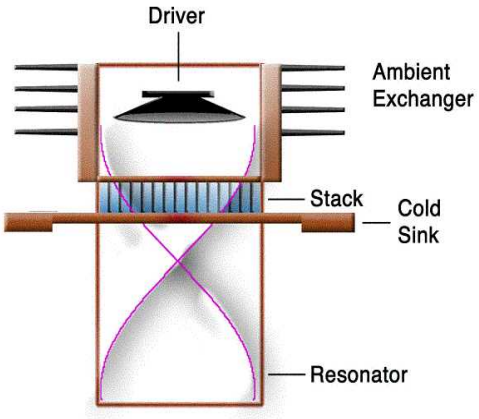
The Center's technology is based on two effects in thermo acoustics. The first is that heat can be converted into sound energy; and second, that sound can pump heat. Both have been developed into devices with dimensions ranging from 4 cm to 0.8 cm, with the possibility for further miniaturization and microcircuit integration.

CENTER FOR

ACOUSTIC COOLING

Figures below show the basic units for circuit applications: spot-cooling of heat pumping, and heat removal by acoustic radiation and energy conversion to electricity.





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CENTER FOR

ADVANCED JOINING OF MATERIALS

BRIGHAM YOUNG UNIVERSITY

CENTER

The Center for Advanced Joining of Materials **(CAJM**) is developing enhancements and new technologies based on friction stir welding (FSW). FSW is a relatively new, innovative joining technology that is revolutionizing the way in which aluminum and copper materials are being joined. The objectives are to develop enhancements to this existing technology that will broaden the use of this process in new materials and applications, and to transfer these technologies to local, national and international companies.

Can you imagine…..

A new method for welding metals and plastics that does not melt the material, does not add new material, and forms a joint that is base metal strong and virtually undetectable from the surrounding material?

ACCOMPLISHMENTS

All of the third-year milestones have been met. To date, the Center has submitted five provisional patents. Of these, BYU has issued an exclusive license for the patent on super abrasive tools to a local Utah company. Co-development and marketing of these tools are continuing. BYU is presently seeking a partner for co-development on the FSW of polymeric materials. The center is currently pursuing another licensee and co-development partner, and anticipates this to be finalized during year four of funding. The Direct Machine and Controls patent was transitioned into its own Center for fiscal year 2002-2003.

TECHNOLOGY

The Center is currently focused on the development and marketing of three technological aspects of FSW: 1) tooling that will last longer, offer the ability to join a wider range of advanced materials, and enable better control of the resulting quality of the weld and its properties; 2) new control systems and hardware for large scale, three-dimensional FSW capabilities; and 3) new methods and novel tooling for joining polymeric materials.

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CENTER FOR

ADVANCED STRUCTURAL COMPOSITES

BRIGHAM YOUNG UNIVERSITY

CENTER

The objective of the Center for Advanced Structural Composites is to develop the commercial potential of the IsoTruss technology. The IsoTruss enables the creation of super lightweight grid structures with the potential for revolutionizing industries as diverse as civil infrastructure (e.g., communication and construction), aerospace, automotive, marine and sporting structures and virtually any application area requiring high strength, high stiffness, light weight and superb corrosion resistance.

Can you imagine…..

A power line transmission tower that can withstand extreme wind conditions, support tremendously heavy loads, remain corrosion free, be unaffected by temperature extremes, and weighs significantly less than conventional steel towers?

TECHNOLOGY

The core technology consists of an ultra-lightweight composite structural shape known as the IsoTruss. The IsoTruss is a novel, patented, three-dimensional structural form that takes advantage of the highly directional properties of high strength composites to produce an extremely efficient and lightweight structure. The IsoTruss incorporates stable geometric configurations with helical members that spiral in opposing directions around a central cavity, coupled with longitudinal members that pass through the intersections.

IsoTruss STRUCTURES, INC.

ACCOMPLISHMENTS

Several companies are currently negotiating licensing agreements with BYU for the IsoTruss technology, and a new Utah firm has licensed the rights for domestic commercial applications. As the core technology matures, additional discoveries, applications, and developments will provide ever increasing requirements for research and opportunities for funding.

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CENTER FOR

AGRICULTURAL BYPRODUCTS (PROFITABLE USES OF)

CENTER

UTAH STATE UNIVERSITY

The Center for Profitable Uses of Agricultural Byproducts was established to strengthen the economy of Utah, particularly the rural economy, by working closely with farmers, ranchers and other agricultural related businesses to transfer technologies utilizing agricultural production and processing byproducts. Byproducts of no or little value are transformed into energy and other salable items using technology developed at the center.

Can you imagine…..

A technology utilizing agricultural byproducts of little or no value and transforming these byproducts into a profitable business?

ACCOMPLISHMENTS

A fully operational system has been built at the Caine Dairy at Utah State University and is open for visits to see the system functioning, creating a showcase of this technology. Biogas can be seen burning at this site to produce hot water. A new, larger system is soon to come on line at the Ballard pig farm in Benson, UT. This new system is designed to produce enough electricity for 65 homes while treating pig manure. The system will be housed in an attractive metal building. This system is scheduled to be fully operational in early spring, 2003. The IBR technology is very unique and easy to manage, with a high treatment rate and reliability. The Ballard system will be controlled using a touch screen computer. This Center has partnered with HEE, a new Utah company, to provide engineering design. Another new Utah company is being formed to build the systems.

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CENTER FOR

AGRICULTURAL BYPRODUCTS (PROFITABLE USES OF)

UTAH STATE UNIVERSITY

TECHNOLOGY

The technology developed at Utah State University for the profitable use of food production and processing byproducts is manifested in two major areas: 1) anaerobic systems that can produce energy (biogas) and soil amendment from manure and food processing waste, and 2) components of a high rate aerobic bioreactor (drum composter based) system that make the process more cost effective, and the products produced by the process more valuable.

Placement and painting of tanks for the IBR system at Ballard farm, Benson, UT

CENTER FOR

BIOMEDICAL OPTICS

UNIVERSITY OF UTAH

CENTER

The goal of the Center for Biomedical Optics is to commercialize optical technologies for diagnostic, therapeutic and disease risk assessment in medicine. Recent advances in novel light sources, laser materials and laser spectroscopy make these optical techniques highly attractive for novel, non-invasive assessment.

TECHNOLOGY

The Center's technologies include Resonant Raman Scattering detection of carotenoid antioxidants in human tissue and a novel light source for biomedical spectroscopy.

ACCOMPLISHMENTS

Nutriscan, Inc. was formed during the second year of COEP funding and negotiated a license for our US Patent No. 6,205,354B1: Method and Apparatus for Noninvasive Measurement of Carotenoids and Related Chemical Substances in Biological Tissue. This patent was issued March 20, 2001 for technology supported by earlier COEP funding. In September, Raman detection technology was licensed to Cardoderm, Inc.

Can you imagine…..

A non-invasive optical laser technique that can detect and treat cancerous cells in the skin or mucosal tissue??

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CENTER FOR

BIOREMEDIATION

WEBER STATE UNIVERSITY

CENTER

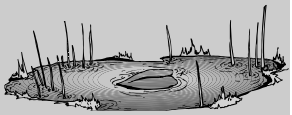
The Center for Bioremediation develops, refines, and implements innovative biotechnologies for the removal of heavy metal and other inorganic contaminants. The Center's technology focus is biological selenium removal. Additional technologies include technologies for arsenic removal and cyanide degradation with a current emphasis on enzymatic cyanide degradation.

TECHNOLOGY

The Center's field-proven biotechnologies include Selenium reduction, Arsenic Reduction and Cyanide Biooxidation Technology. Selenium Reduction technology is capable of economically removing this contaminant from wastewaters to below detection levels. The Center's selenium technology is based on a novel implementation path requiring a front-end analysis, specially adapted naturally occurring microorganisms, and patented and proprietary process configurations. This path provides unique bioremediation technologies that are more economical, faster, and more durable than other bioremediation technologies. The Arsenic Reduction Technology is based on selected and specially adapted naturally occurring microorganisms, and patented and proprietary process configurations.

Can you imagine…..

A faster and more economical way to remove heavy metals, such as arsenic or cyanide, from wastewaters to a point below detection, with naturally occurring microorganisms?



The Cyanide Biooxidation technology is based on selected and specially adapted naturally occurring microorganisms and patented and proprietary process configurations and developing enzymatic technology

ACCOMPLISHMENTS

The Center's technology has been demonstrated to be approximately 1/10 the cost of EPA's past BDAT and removes selenium to lower levels. Applied Biosciences is a successful spin out company.

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CENTER FOR

CELL SIGNALING

CENTER **UNIVERSITY OF UTAH**

Cell signaling consists of the set of biochemical interactions that mediate physiological changes within and between living cells. When a ligand binds to a receptor, for example, the interaction causes a biochemical response within the cell. Many diseases are associated with signaling pathways that have gone awry -- cancer, allergy, asthma, and acute inflammation are all examples of cellular responses unchecked by normally self-regulating pathways. The absence of a single protein or lipid can result in the disruption of a pathway that may be crucial for cellular function. The CCS Faculty seeks to understand these fundamental signaling pathways. By identifying technologies to manipulate the signaling processes, highly selective pharmaceutical agents can be developed to treat cancer, diabetes, and cardiovascular disease.

ACCOMPLISHMENTS

Echelon Biosciences, Inc., initially started in 1997 as Echelon Research Laboratories as the first spin-off company from CCS, has grown to 30 employees, has received a total of nineteen Phase I and Phase II SBIR awards, and surpassed the $1 M sales mark in 2002. With the recruitment of former Iomed executive W. Tim Miller as its president and its expansion to new space in Spring 2003, Echelon is positioned to become a premier, home-grown biotechnology company. Locally, Echelon and CCS have met with the governor's technology development officials to foster the growth of a Wasatch front biotech cluster. Echelon was awarded the Tibbetts' Award for Small Businesses again in 2002, following its first award in 1999. Echelon has established a cancer drug discovery alliance with ComGenex, a Hungarian company, a product distribution agreement with Molecular Probes, Inc. in Eugene, OR. Its discovery of signal transduction inhibitors has generated interest in alliances or investments by a dozen major pharmaceutical companies and other potential investors.

CENTER FOR

CELL SIGNALING

UNIVERSITY OF UTAH

TECHNOLOGY

Five core faculty and fifteen faculty associates bring extensive, complementary research expertise to focus on understanding the molecular mechanisms by which cells communicate, both under normal conditions and in disease states. The interdisciplinary collaborations among the faculty have produced unique insights into the molecular basis of disease. Understanding these biomolecular interactions can lead to the development of new drugs that enhance or interfere with cell signaling by small molecules. New technology from CCS has also been developed and licensed by Echelon to create a molecular sensor for directly monitoring heparin levels in blood. A microbiological assay platform invented by Dr. C. D. Poulter for identification of selective anti-anthrax agents was also optioned by Echelon. The discovery in 2002 of a natural ligand for the nuclear protein target of the $3 B/yr diabetes drug rosiglitazone emerged from collaboration by Drs. McIntyre, Prestwich, and Zimmerman.

Can you imagine…..

A new class of anti-cancer drugs that correct a molecular defect that can be diagnosed very early, while the cancer can still be cured?

echelon
biosciences incorporated

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CENTER FOR

COMPLIANT MECHANISMS

BRIGHAM YOUNG UNIVERSITY

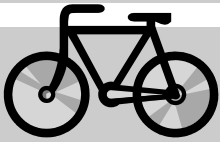
CENTER

The objective of Compliant Mechanisms is to accelerate and streamline the development and commercialization process of compliant mechanisms, so that they may be quickly licensed to existing or new companies. The use of innovative and patented compliant mechanisms will give existing companies a clear competitive advantage, and will provide a unique and valuable product for new companies. The potential market applications and opportunities are immense.

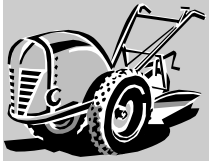
ACCOMPLISHMENTS

Some examples of compliant mechanisms that have been designed and tested are: fishing reel, bicycle freewheel, derailleur and brakes, pull start for small gasoline engines, centrifugal clutches, string trimmer, small garden tiller clutch , go-cart clutch, continuously variable transmissions (CVT), general purpose belt drive CVT , second generation bicycle CVT prototype , bistable mechanisms, compliant parallel motion mechanisms, constant-force mechanisms, electrical contacts for PDA docking stations, fully compliant bistable micro mechanism,
thermal actuators, linear motion micro-bistable mechanism and two position latching mechanism.

Can you imagine…..



A method for redesigning any complex machine part to significantly reduce the number of parts, simplify the manufacturing process, reduce costs and end up with a more reliable and wear- resistant device?



TECHNOLOGY

The Center possesses methods for the design of compliant mechanisms that have reduced part count reduced cost and increased precision compared to conventional mechanisms. A number of specific classes of mechanisms have been investigated and developed for commercialization.

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CENTER FOR

(CROMDI) REPRESENTATION OF MULTI-DIMENSIONAL INFORMATION

UNIVERSITY OF UTAH

CENTER

The Center for the Representation of Multi-Dimensional Information (CROMDI) was established to commercialize a new audio-visualization technology (IntuInfo) that facilitates the rapid and accurate analysis of large quantities of real-time data. CROMDI is an interdisciplinary team dedicated to the innovative representation of information and comprised of experts in Architecture, Art, Communication, Computer Science, Engineering, Finance, Mathematics, Medicine, Music, and Psychology. These diverse experts participate with their own unique perspectives and provide solutions to complex information design needs through a unique methodology and iterative process that has been refined over the years.

TECHNOLOGY

Information is intuitively presented with specifically designed audio-visual objects that exhibit changes in color, shape, size, sound, etc., driven by data variables and their relationships. IntuInfo can maximize information per screen space, integrate many variables, enable comparison to normative values, simultaneously display present and historical data and zoom to global or local contexts. Because of its intuitive features, IntuInfo enables to the user to recognize, understand and act on events faster, more accurately, with less mental effort, and with less training than is possible using existing data visualization technologies. In fact, the state of the art in many fields is to represent information with plots, pie charts, graphs, icons, and matrices that need extensive training and have limitations to the display of large quantities of data.

ACCOMPLISHMENTS

In the second year of funding CROMDI licensed the "cardiovascular display" to GE Medical Systems, formed a company called MedVis Inc. to commercialize the "drug display" and developed seven potential licensees. CROMDI received the First Place Award for "Best New Technology" from the Anesthesia Safety Association. Also, a NASA STTR grant was awarded to monitor the physiologic state of astronauts. CROMDI has received a DARPA seed grant to develop a pilot study and audio-visualization concepts for displaying the network status and resources to commanders. Also, a new audio-visual concept has been conceived (and is being patented) to support scheduling problems: this shall apply to both resource management and intelligence (detecting patterns of hackers, terrorists, etc.). A demo of financial displays was presented in New York City to 11 firms (investment banks, financial data vendors, and electronic exchanges) and elicited particular interest;: CROMDI is preparing for a better financial market condition to cement a partnership. CROMDI has also recently started working with the Flying J refinery for a process control demo.

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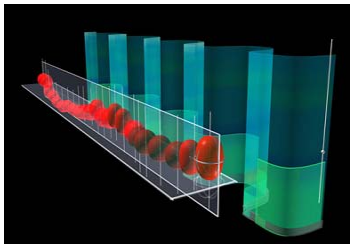
CENTER FOR

CROMDI (MULTI-DIMENSIONAL INFORMATION)

UNIVERSITY OF UTAH

ANESTHESIA. Anesthesiologists face unexpected incidents during 20 percent of all procedures. One quarter of these incidents represent critical events posing significant danger to patients. Therefore, quick and accurate decisions are of major importance in anesthesia. The environment is stressful and the task is difficult, because 30 or more variables need to be monitored and mentally correlated and integrated. The CROMDI team developed working prototypes that significantly reduce recognition times for detecting, diagnosing and treating anesthesia-related critical events. Testing showed a statistically significant decrease in detection time in several critical scenarios: Clinicians detected anesthesia-related critical events sooner (3.1 vs. 5.5 min). Abnormal events were diagnosed more accurately (error rate 1.1% vs. 4.1%) *Problems were corrected in one-third the time (17 sec vs. 45 sec) and drug delivery was better controlled (EC95 error 21% vs. 44%).

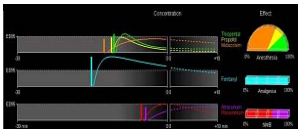
FINANCE. Investment professionals and individuals have access to a wealth of information about companies as well as real-time, historical and comparative market data. They want access to more data, but complain about too much data on their displays: this problem seems contradictory, and it can not be solved with current display technology. CROMDI developed prototypes that integrate large quantities of data in a way that will lead the user to make rapid and accurate decisions. Macro and middle level displays allow the trader to quickly view the performance of sectors and stocks in a portfolio. The micro level display allows the trader to analyze the current information on a single stock and quickly view its trend. A customer specified toolkit allows each user to determine the form of objects and select the financial variables to be displayed.



IntuInfo+Anesthesia

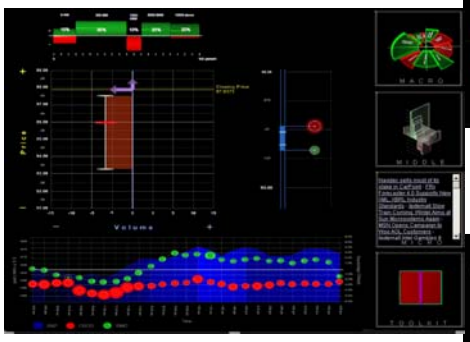
Traditional Anesthesia Display

Cardiovascular and Pulmonary



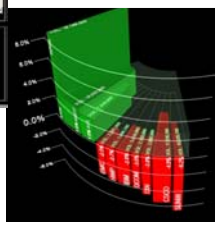
Drug Display

IntuInfo+Finance



Micro-View *displays three objects showing the current information on a single stock.*

Macro-View
Middle-View *shows the same variables*



CENTER FOR

ELECTRONIC MEDICAL EDUCATION

CENTER

UNIVERSITY OF UTAH

The Center for Electronic Medical Education (CEME) is part of the Electronic Medical Education Resource Group (EMERG) at the University of Utah Health Sciences Center (UofU). The focus of this Center is to develop component software technology for use by physicians and scientists in image intensive fields, specifically targeted at annotation and knowledge representation. Initially, the software consisted of author tools for medical case creation and information management of image intensive data for publishing web-based clinical reference material. In fiscal year 2002, the original technology development was extended into decision support and evidenced-based medicine solutions, biomedical imaging and bioinformatics. CEME established itself as a multidimensional technology hub by extending technology development into three additional markets. Those markets are: 1) cross-media publishing and digital content distribution, 2) electronic medical records (EMR) , specifically collection of expert knowledge and annotation of visual data as part of the clinical workflow, and 3) biomedical/biotechnology imaging informatics.

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ACCOMPLISHMENTS

As part of our objectives, CEME has adopted an intellectual property strategy of maximizing commercial potential by decomposing CEME technologies into as many individually licensable pieces as possible. This strategy recognizes that software applications developed for medical publishing contain intellectual property threads that can be pulled out into individual invention disclosures and woven into new combinations to meet market needs. The additional markets lead to new commercial entities that push the technology into new markets.

The following is a list of accomplishments:

A commercial spin-off, AMIRSYS, Inc., that produces electronic reference material.

A right to use license with AMIRSYS, Inc. for UofU image content.

Established the CEME as a multidimensional technology hub that addresses the needs of image integration in the electronic medical record and field of biomedical imaging informatics.

Strategic positioning of CEME technology with key industry participants that has resulted in a Memorandum of Understanding and Teaming Agreement to get CEME technology into Battlefield Telemedicine.

Patent on the core technology.

CEME technology generated multiple invention disclosures as part of a multidisciplinary collaboration and technology development effort.

CENTER FOR

ELECTRONIC MEDICAL EDUCATION

A new commercial spin-off company, Resilient Imaging, that is a services-based company for integration of annotation and knowledge representation technology.

Two SBIR grants have been submitted to the NIH National Institute for Biomedical Imaging and Bioengineering and the NIH National Cancer Institute for further development of CEME technology.

Resilient Imaging is in the process of negotiating a non-exclusive license for the CEME technology and patent with the Technology Transfer Office at the University of Utah.

TECHNOLOGY

CEME technology provides clinicians and basic scientists with knowledge representation tools built on the need to visually annotate (identify and label) images and add expert clinical knowledge (e.g., diagnosis, pathology report or clinical note) image data in the healthcare enterprise. The technology enables collaboration and sharing of results at each stage of the clinical management of a patient or clinical study, and provides a mechanism to track multiple images that are generated from multiple imaging modalities that exist in disparate file systems across the research and healthcare enterprise. CEME technology was developed in response to the critical need to capture the growing and evolving base of imaging results and expert knowledge, so that downstream experts can utilize previous results. The goal is to improve the process of scientific discoveries and healthcare by developing technology for the purposes of consistent, context-appropriate communication and collaboration, standardization and interoperability of clinical tools and interactive presentation of data.

CEME technology solutions facilitate the incremental and collaborative collection of expert knowledge in the form of non-destructive visual annotations and text that readily make the collected information available to other experts. The following list outlines the benefits of CEME technology:

Reduces repetition of work by image re-interpretation. Gives physicians and scientists the ability to incrementally add expert knowledge. Supports multi-specialty authoring of single images. Enables sharing of images and applied expert knowledge. Reduces replication of reference images that complicates storage and retrieval. Developed technology uses visual annotations that are not embedded in the images and subsequently do not alter or destroy the image data (i.e., image pixels). Provides the ability to integrate lexicons and medical vocabularies. Structured textual information with image information. Provides a solution to link image and expert knowledge. Interactive, instructive representation of multi-specialty expert knowledge. Enables physician-physician, physician-scientist and physician-patient interaction..

CENTER FOR

MICROBE DETECTION & PHYSIOLOGY

CENTER

UTAH STATE UNIVERSITY

The focus of this center is the development of technologies that lead to the real time detection of pathogenic micro-organisms. This involves the development of novel pathogen capture molecules, platform development, prototype development, and commercialization. Industries where this technology is useful include pharmaceuticals, biomedicine, biotechnology, veterinary, production agriculture, food processing, public health, defense, and water and sewage treatment.

Can you imagine…..

Being able to detect less than 10 cells of a harmful pathogen, such as salmonella or E. coli, in a quart of milk, within 30 minutes?

TECHNOLOGY

The primary focus of the Center is bacterial detection, but other targets are also investigated. To date, four technologies have been developed: ImmunoFlow, ImmunoDNA, GlycoBind, and TissueTag. Each technology has a unique use and application, but is not limited to a single type of use. For example, ImmunoFlow has many fields of use ranging from water to air, and has the potential to detect many types of bacteria. Initial prototypes are available for Bacillus globgii spores, Lactobacillus, Salmonella and E. coli O157 cells. Each type of assay has a maximum detection time of 30 minutes with a sensitivity of less than 10 cells. A unique feature of each technology is that it is volume independent; both large (tens of liters) and small (1 to 100 milliliters) samples are commonly used. Each technology is at a different stage of development, with ImmunoFlow being the most developed.

ACCOMPLISHMENTS

The Center has licensed the ImmunoFlow technology to Stellar Technologies, and is ready to proceed with alpha and beta testing. A new company was formed (BioMatrix Solutions) to produce and market ImmunoFlow under the name of LumiFlow. Initial marketing efforts are being directed to the food and beverage industry.

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CENTER FOR

NUCLEAR, MEDICAL AND ENVIRONMENTAL TECHNOLOGIES

CENTER

UNIVERSITY OF UTAH

Large companies are currently downsizing, outsourcing, and eliminating risky and costly nuclear research and development (R&D) capabilities, and are teaming with universities with established nuclear engineering programs and research facilities to perform key services. An additional market trend is for companies to off-load ownership and operation of their nuclear testing, diagnostic, and irradiation facilities, and to contract with new owners for specific access and services. Others are simply decommissioning their nuclear facilities without replacement. The result is a decrease in availability of licensed facilities. That, in combination with an increasing demand for services from the private sector, provides the basis for a solid commercial opportunity. The commercial strategy of the **Center for Nuclear, Medical, and Environmental Technology (CNMET)** is to acquire selected spun-off facilities and consolidate existing niche markets into a single, well-managed and licensed entity that can provide a convenient source for a full range of nuclear services. E-Cubed and Nuclear Labyrinth will assume commercial production to reduce costs, implement uninterrupted production cycles, and achieve economies of scale. Appropriate R&D functions then will be merged and contracted to universities with nuclear facilities, such as the University of Utah's TRIGA reactor, to promote innovation, train co-operatively, and supply a steady stream of knowledgeable and seasoned potential employees to the workforce.

ACCOMPLISHMENTS

CNMET has investigated market sector definition and market research studies for medical radioisotopes (seeds); neutron, gamma, and x-ray radiography; irradiation survivability of electronic components; and plutonium (Pu)-bioassays. CNMET is currently in a position to launch a new company, called "Nuclear Labyrinth LLC," and to facilitate the growth of a second business, E-Cubed Inc. These Utah-based companies will implement contracts for the use of the University of Utah's reactor. The CENTER will perform R&D activities for these companies that will result in new IP, which subsequently can be licensed through the TTO. CNMET continues to identify other underserved clients through its targeted market research.

CNMET will graduate from the state-supported Centers of Excellence (COE) program at the end of its fiscal year's funding (June 30, 2003). Beginning July 1, 2003, after only two years, CNMET plans to be financially independent, without further need for COE resources.

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CENTER FOR

NUCLEAR, MEDICAL AND ENVIRONMENTAL TECHNOLOGIES

TECHNOLOGY

A newly spawned entity, Nuclear Labyrinth LLC, along with an existing Utah business, E-cubed Inc., will offer a variety of commercial nuclear production services. Both Utah-based companies plan to contract major portions of their R&D functions to the University of Utah's Center for Excellence in Nuclear Technology, Engineering, and Research (CENTER) and license back any applicable intellectual property (IP) from the Technology Transfer Office (TTO). The CENTER will provide valuable hands-on training functions for both of its partner organizations. Combined commercial missions will improve and expand nuclear services to existing and underserved clients. Operations will be conducted, via contracts, at four locations:
1) Little Mountain, Utah. E-Cubed Inc.'s activities will include introducing commercial opportunities into the Survivability and Vulnerability Integration Center located at Little Mountain, Utah. E-Cubed and Hill Air Force Base (HAFB), the owner of the Little Mountain facility, will enter into an industrial partnership in 2003. E-Cubed will be performing material diagnostics for civilian work from major commercial parts manufacturers (aerospace, automotive, energy, electronic, etc.). Non-defense work is initially estimated to be at least $1 million/year. 2) California. A major multinational company recently retained one of its divisions that operates a nuclear reactor in California in order to consummate a recent spin-off transaction. Due to the sensitivity of the information and current negotiations, the identity and location cannot be cited here. The parent company now wants to divest itself of the material diagnostic activities that use a reactor, because of burdensome regulations and perceived operational risks involved in conducting operations outside their core business. The company is willing to self-finance the reactor sale to a suitable buyer over a period of three to five years. Furthermore, transfer of reserve-fund obligations and liabilities associated with decommissioning the reactor to a buyer can be achieved on advantageous terms for the buyer. E-Cubed is ideally suited to acquire the reactor facility and to assume full operational responsibilities at the current reactor's site; to convert its technology to all-digital production format; and to add related interpretative and design services (i.e., radiation detection, dosimetry, analysis etc.) to significantly increase revenues. 3) Salt Lake City, Utah. Nuclear Labyrinth will operate a computational group engaged in simulating and modeling advanced radiation technologies and related processes. This group will be active in international activities supported by government and industry. 4) University of Utah CENTER. Nuclear Labyrinth and E-Cubed plan to contract with the CENTER at the University of Utah for various research and development projects, such as the digitization of current California radiography imaging technology, the development of rapid bioassay techniques, and to enhance computer codes. The newly developed proprietary technologies then will be licensed back to the two companies via the TTO. CNMET intends to conduct targeted market research to identify other underserved clients for both Nuclear Labyrinth and E-Cubed.

CENTER FOR

PETROLEUM RESEARCH

UNIVERSITY OF UTAH

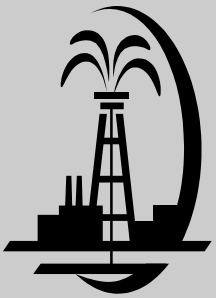
CENTER

The mission of the Petroleum Research Center (PERC) at the University of Utah is to conduct research and development studies leading to practical, cost-effective solutions to liquid hydrocarbon production, handling and transportation. With funding from the U.S. Department of Energy and the petroleum industry, the PERC coordinates basic and applied research in: the physical properties and physical and chemical thermodynamics of naturally occurring hydrocarbons, development of pipeline transportation and flow assurance strategies, and simulation, optimization and control of oil and gas recovery methods.

TECHNOLOGY

The Petroleum Research Center (PERC) was funded to commercialize and market two specific areas of work: understanding problems related to the production, transportation and processing of waxy and asphaltenic crude oils and the subsequent alleviation of these problems and developing a variety of methods and software tools (models) for the efficient and optimal production of oil and gas from underground reservoirs. Over the last several years, oil companies and federal agencies have funded (and continue to fund) research in PERC, which is an integral part of the Department of Chemical and Fuels Engineering at the University of Utah.

Can you imagine…..



A variety of methods and software tools for the efficient and optimal production of oil and gas from underground reservoirs?

ACCOMPLISHMENTS

Schlumberger and Halliburton donated software worth about $10 million, making the Center the premier state of the art oil reservoir simulation facility. Alyeska Pipeline Service Company employed a professional with a Ph. D. in Salt Lake City to monitor technology development at the Center. Universal Oil Products and Flying J conducted a project to test the performance of one of their new process units at the Center.

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CENTER FOR

RAPID PROTOTYPING

UNIVERSITY OF UTAH

CENTER

The Center for Rapid Prototyping is focused in the areas of ultrasonic sensing of injection molding, and physical and virtual geometric modeling for computer aided design.

TECHNOLOGY

This Center is focusing on several projects which include machining techniques to include a method for making Powder metal parts, a low cost software allowing the production of prototype parts on a 2 or 3 axis computer controlled router or mill, and machining of molds for micro-injection molding. Examples of products include:

*A series of new sensors and control techniques for improved polymer processing

*A new Personal Prototyping System (PPS) that makes rapid prototyping available to small companies and perhaps the private consumer.

*A low cost 3D scanning system that, used in conjunction with the PPS becomes a 3D fax machine.

*A device that is capable of building very large prototypes (Shapemaker).

*A photopolymer based technique to create prototypes in a single step (Inverse Tomographic Construction or ITC).

Can you imagine…..

A personal prototyping system that develops and creates prototypes at a very low cost on your own inkjet or laserjet printer???

ACCOMPLISHMENTS

In the first year of funding, several milestones were met including the completed commercial RapidPro software, proof of principle demonstration of the Personal Prototyping System, a demonstration of the Ultrasound sensor to a local company, and a completed calibration demonstration for the 3D scanner.

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CENTER FOR

SMART SENSORS

UTAH STATE UNIVERSITY

CENTER

Smart Sensors probe the environment and modify their function in order to improve their data gathering capability. A smart sensor adapts to its environment, and sends improved data to the main processing computer. A smart sensor melds sensor, signal processing, and computer technologies. Applications span medicine, precision agriculture, electronics manufacturing, wireless communication, transportation and radar.

TECHNOLOGY

The Center for Smart Sensors focuses on two core technologies that have the greatest commercial potential, and five support technologies that are key aspects of the Center and enable the development and implementation of products utilizing the core technologies. This year we have added to the methods available for our core technologies, and are actively seeking license agreements in each of our core technology areas. Additional patents and invention disclosures have been filed in both core areas this year. Both families of technologies are based on simple ideas and simple circuits that result in two critical advantages **-- Small and Cheap**. This makes them applicable to a wide array of applications.

Can you imagine…..

An early warning system for computer disk drive failure, a preflight test system for aging aircraft wiring, and a system to protect military personnel from being overrun by tanks?

ACCOMPLISHMENTS

A lot of recent media attention has occurred surrounding the Center's smart wiring devices. This is driving potential partners and buyer agencies to demand our technology earlier than expected, and we may be able to sell a prototype design soon. We have begun to systematically dissect the technologies that may compete with our imbedded antenna technology to look for applications that could benefit from smaller and cheaper smart sensors.

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CENTER FOR

VASCULAR BIOTHERAPEUTICS

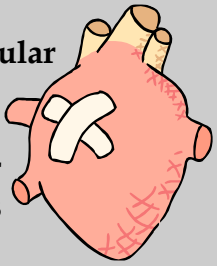
CENTER

UNIVERSITY OF UTAH

The Center for Vascular Biotherapeutics is focused on commercializing medical strategies and devices that target blood vessel formation for the treatment of cancer and obstructive vascular diseases such as atherosclerosis. This Center capitalizes on a robust scientific program aimed at deciphering the molecular blueprint for vessel regeneration using human genetics and transgenic mice technologies; these technologies were pioneered at the University of Utah. The "Functional Vascular Genetics" program established at the University of Utah is identifying genes that are essential for vascular development. This program has significantly contributed to the understanding of how blood vessels are formed, and produced publications in the most prestigious scientific journals (e.g. *Nature, Science, Nature Genetics, Journal of Clinical Investigation, American Journal of Physiology).*

Can you imagine…..

Deciphering the molecular blueprint for vessel regeneration, in order to treat cancer and other vascular diseases such as atherosclerosis?



TECHNOLOGY

There are two major thrusts of the program. The first involves understanding the role of the matrix protein elastin in regulating vascular smooth muscle cell proliferation, migration and differentiation. The second is to identify novel molecular pathways involved in angiogenesis. The purpose of the center is to commercialize the scientific discoveries of the program.

ACCOMPLISHMENTS

In the first year, the Center has met all three of its critical commercialization objectives: testing therapeutics in pre-clinical trials, licensing its intellectual property to private industry, and spinning off a biotechnology company.

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Program Description

PROGRAM DESCRIPTION

BACKGROUND

The Utah State Legislature created the Centers of Excellence Program (COEP) in 1986 recognizing that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes. The Legislature recommended the allocation of economic development funds each year to the COEP, to be awarded to college and university faculty on a competitive basis. The objectives of the COEP are to enhance and expand the applied technical research activities at institutions of higher education in Utah, to develop technologies that are considered to have potential for economic development in the state, and to assist in the actual commercialization of those technologies. This research and technology commercialization process ultimately results in the creation of new companies, the enhancement of business opportunities for existing companies that license COEP technologies, and in the growth of Utah's job opportunities. In addition, the proprietary value of technologies created is reflected in the number of patents issued and the associated royalty-bearing licenses that are signed.

These measurement parameters (jobs created, companies assisted and/or created, inventions disclosed or patents issued, and license agreements signed) are summarized in this report as indicators of the value of the COEP to state economic development.

Ongoing funding of the program has been based upon the real and potential economic impact that the Centers of Excellence Program has had upon the State of Utah during the years since its creation. This Annual Report summarizes the significant accomplishments of the program during the recently completed fiscal year and attempts to identify the long-term economic value of that work.

OPERATIONS AND OBJECTIVES

The operating methods of the Centers Program have evolved over the years since its inception with a continuing goal of achieving the maximum economic benefit from the individual Centers that have been created. Upon selection on a competitive basis, new Centers are funded with a minimum requirement of a 2:1 matching fund ratio from the private and federal sectors. Matching funds are reported and audited on a regular basis. Centers are also audited regularly for the achievement of technical and commercial milestones. Center directors are required to submit annual reports to the COEP director. The Centers of Excellence Program Annual Report, here attached, is based on submitted reports and upon information gathered from site visits, audits and other data sources. In addition, each funded Center is assisted by one or more designated commercialization consultants who assist Center directors in defining commercialization strategies, performing market and competitive analysis and locating potential investors or licensees.

Centers are normally funded for a maximum of five years and are then expected to be self-sustaining through license contract royalties and new research grants. Centers with especially noteworthy histories and ongoing technological impact are designated as Distinguished Centers and thereafter may be funded on a project-by-project basis as requests are approved.

CENTER SELECTION PROCESS

Proposals from researchers for new Centers of Excellence or for renewal of existing Centers of Excellence are submitted to the COEP office in response to a Request for Proposal which is normally sent in late December. The incoming proposals are critically reviewed by the Centers of Excellence Advisory Council. Centers are selected for funding based on a ranking established in extended review sessions with the Centers Advisory Council.

The State Advisory Council for Science and Technology has advisory responsibility for the Centers of Excellence Program by statute. Members of the Science Council participate on the Centers Advisory Council in reviewing proposals and conducting site visits. This provides Science Council members with in-depth knowledge of the program, Center specific information and a strong technical and industrial perspective for making funding decisions. The State Science Advisor reviews the Annual Report and presents it to the Science Council for acceptance. The Director of the Office of Technology Development serves as an ex-officio member of the State Advisory Council for Science and Technology.

COMMERCIALIZATION PROCESS

Over the past five years, the Centers of Excellence Program has funded a consulting program to assist Center directors in preparing and implementing commercialization strategies. Each Center is unique in terms of which strategy is optimal - there is no single solution and each requires customized approaches.

Early market surveys and competitive analysis are conducted to discover which market segments are most promising and which product features will be of interest to potential customers and licensees. Consultants assist in targeting potential licensees for the technology and in positioning products for anticipated markets.

These early strategic discussions often reveal product variations that can be introduced to the marketplace earlier than previously planned. Such early commercialization has several benefits: (i) getting products to consumers for preliminary market validation and directional planning; (ii) early cash flow strengthens continuing research at the Center and hastens financial independence and; (iii) the future value of technology licenses are enhanced.

The Centers of Excellence Office works closely with the Technology Transfer Offices at the respective universities in an effort to extract maximum value from the licenses that are signed for Centers technologies. Through the commercialization consulting program, assistance is given in defining market opportunities, identifying potential target licensees, providing key information for license valuations, and consulting assistance to those companies considering license opportunities.

2001-2002 Financial Summary

CENTERS OF EXCELLENCE - 2001/2002 FINANCIAL SUMMARY

	Years Funded	State Funding 2001/2002	Fed. Match 2001/2002	Private Match 2001/2002	Total Match 2001/2002
CENTERS FUNDED IN FISCAL 2001/2002					
Acoustic Cooling Technology-U/U	2	$100,000	$214,982	$0	$214,982
Advanced Joining of Materials-BYU	3	$130,000	$230,000	$35,000	$265,000
Advanced Structural Composites - BYU	4	$120,000	$150,000	$210,000	$360,000
Agricultural by-products, profitable uses of-USU	2	$100,000	$247,000	$50,000	$297,000
Biomedical Optics - U/U	3	$150,000	$170,356	$645,534	$815,890
Bioremediation-WSU	4	$68,000	$184,000	$0	$184,000
Cell Signaling - U/U	5	$170,000	$6,095,000	$200,000	$6,295,000
Compliant Mechanisms -BYU	3	$130,000	$284,000	$0	$284,000
Electronic Medical Education - U/U	3	$120,000	$47,000	$193,000	$240,000
High Performance Computing-U/U	2	$130,000	$473,314	$0	$473,314
Microbe Detection - USU	4	$120,000	$0	$356,000	$356,000
Nuclear, Medical and Environmental Technologies-U/U	1	$100,000	$154,000	$52,000	$206,000
Petroleum Research-U/U	2	$120,000	$275,000	$8,300,000	$8,575,000
Rapid Prototyping-U/U	1	$100,000	$534,720	$0	$534,720
Smart Sensors-USU	2	$110,000	$541,198	$0	$541,198
Vascular Biotherapeutics-U/U	1	$100,000	$867,649	$0	$867,649
Subtotals:		**$1,868,000**	**$10,468,219**	**$10,041,534**	**$20,509,753**
2001/2002 MATCHING RATIO		11.0 :1			
$7000 per center for consulting program		$112,000			
Total amount distributed		$1,980,000			
Remaining amount for planning grants		$20,000			
Total amount funded FY 01-02		$2,000,000			

CENTERS OF EXCELLENCE - 2001/2002: Summary of Key Commercial Accomplishments

	Spin-Off Companies		Companies	Patents/Copyrights		Licenses
	New	Total	Assisted	Pending	Issued	Signed
CENTERS FUNDED IN FISCAL 2001/2002						
Acoustic Cooling - U/U	0	0	12	2	0	0
Advanced Joining of Materials-BYU	1	1	50	7	0	1
Advanced Structural Composites - BYU	1	3	65	6	0	4
Biomedical Optics - U/U	0	1	5	3	1	2
Bioremediation - WSU	0	1	10	0	1	1
Cell Signaling - U/U	0	3	12	0	1	1
Compliant Mechanisms -BYU	0	0	8	11	2	5
Electronic Medical Education - U/U	1	1	3	0	7	1
Microbe Detection - USU	3	4	20	5	2	1
Multi-Dimensional Information-U/U	1	1	10	1	0	0
Nuclear, Medical & Environmental Technologies-U/U	0	0	6	0	0	0
Petroleum Research - U/U	0	0	10	0	4	0
Profitable Uses of Agricultural Byproducts-USU	0	0	15	1	0	1
Rapid Prototyping-U/U	0	0	3	2	0	1
Smart Sensors-USU	0	0	10	7	0	0
Vascular Biotherapeutics-U/U	1	1	3	6	0	1
Subtotals:	8	15	242	51	18	19
All Graduated Centers		109	680	n/a	54	73
All Distinguished Centers		22	191	n/a	33	87
Other Centers not classified above					20	24
TOTALS:	**8**	**150**	**1113**	**51**	**125**	**204**

2002-2003 Funded Centers

Centers selected for funding
Fiscal Year 2002-2003

Acoustic Cooling Technology (U/U) – has developed novel miniature acoustic cooling devices and technologies for application in electronic circuits, computers, lap-top computers, and other small scale devices.

Advanced Joining of Materials (BYU) – Has developed new friction stir welding tools and materials, appropriate control systems and multi-axial capability for all levels of manufacturing.

Advanced Structural Composites (BYU) - Develops commercial products for the integration of damping materials with composites, and the creation of lightweight composite materials.

Biomedical Optics (U/U) – Has developed optical technologies for medical diagnostic and therapeutic (surgical) treatments, e.g. non-invasive assessment and therapeutic treatments of mucosal tissues.

Bioremediation (WSU) – Has a patented technology for the removal of selenium metal; additional multiple metal removal technologies are poised in the commercialization pipeline.

Compliant Mechanisms (BYU) – Accelerates and streamlines commercial applications of devices that obtain their motion from the deflection of flexible parts rather than from pin joints.

Computational Testing & Design (U/U) - Developing powerful computational packages capable of designing and predicting the electrical, mechanical and structural characteristics of novel materials, especially nanostructured materials and components such as carbon nanotube-based electromechanical devices.

Direct Machining And Control (BYU) - Developing method that allows a manufacturing machine controller to directly interpret CAD/CAM models, resulting in superior resolution for complex shapes. An open architecture, software based controller has been designed and implemented.

Electronic Medical Education (U/U) - Authoring and packaging tools that will be used to create medical education products, and sell them as a component based medical information management and processing system.

High-Speed Information Processing (USU) - Designs, prototypes and commercializes fast algorithms for families of IC chips known as Application Specific Integrated Circuits, or ASIC, which have value in most military and compact consumer electronic devices.

Nuclear, Medical and Environmental Technologies (U/U) – Develops high specific activity, short-lived radioisotopes; production of irradiated seeds for use in treatment of selected cancers; and evaluation of performance of electronic components and integrated systems upon exposure to neutrons.

Petroleum Research (U/U) - Develops cost-effective solutions of liquid hydrocarbon production, handling and transportation. The focus is on assessing the physical properties and chemical thermodynamics of naturally occurring hydrocarbons; optimization of enhanced petroleum recovery; process control and production automation in oil and gas field; and the development of pipeline transportation strategies.

Profitable Uses of Agricultural Byproducts (USU) - Develops cost-effective technologies to treat and dispose of animal waste generated in agriculture. The conversion of the waste products by anaerobic systems results in "biogas" that can be used to produce energy, and nutrients to be used in soil amendments.

Rapid Microbe Detection (USU) – has developed an immuno-flow technology to detect contaminating microbes rapidly, to enhance real time decisions in several industries including food, pharmaceutical and public health.

Rapid Prototyping and Manufacturing (U/U) – Has developed the capability of building very large prototypes and techniques for a large number of molded parts from CAD design in a short period of time.

Representation of Multi-Dimensional Information (CROMDI) (U/U) – Has developed a new visualization technology that facilitates the rapid and accurate analysis of large quantities of complex and continuously changing data, with applications in medicine, finance etc.

Smart Sensors (USU) – Engaged in the development and commercialization of sensor-based products. Product applications span a wide array of sensing and communication needs. An application close to market is the detection of faults in aircraft wiring.

Vascular Biotherapeutics (U/U) – Focused on commercializing medical strategies and devices that target blood vessel formation for the treatment of cancer and obstructive vascular diseases such as atherosclerosis.

Centers of Excellence Legislation

Part 6
Centers of Excellence

9-2-601. Purpose.

(1) The Legislature recognizes that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes. These generally come from strong research colleges and universities. Technical research in Utah's colleges and universities should be enhanced and expanded, particularly in those areas targeted by the state for economic development. Most states are enhancing their research base by direct funding, usually on a matching basis. The purpose of this part is to catalyze and enhance the growth of these technologies by encouraging interdisciplinary research activities in targeted areas. The Legislature recognizes that one source of funding is in matching state funds with federal funds and industrial support to provide the needed new technologies.

(2) The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis.

(3) The Legislature recommends that such funds be allocated on a competitive basis to the various colleges and universities in the state. The funds made available should be used to support interdisciplinary research in specialized Centers of Excellence in technologies that are considered to have potential for economic development in this state.

History: C. 1953, 63-62-1, enacted by L. 1985, ch. 103, § 1; 1986, ch. 109, § 1; renumbered by L. 1992, ch. 241, § 60.

9-2-602. Short title - Definitions.

(1) This part is known as the "Centers of Excellence Act."

(2) As used in this part, "Centers of Excellence" means university-based, industry-supported, cooperative research and development programs.

History: C. 1953, 63-62-2, enacted by L. 1985, ch. 103, § 2; 1986, ch. 109, § 2; renumbered by L. 1992, ch. 241, § 61.

9-2-603. Administration - Grants.

(1) This part shall be administered by the Division of Business and Economic Development.

(2) The department may award grants to the various colleges and universities in the state for the purposes of this part.

(3) Recommendations for funding shall be made by the division with the advice of the State Advisory Council for Science and Technology, with the approval of the board. Each proposal shall receive the best available outside review.

(4) In considering each proposal, the division shall weigh technical merit, the level of matching funds from private and federal sources, and the potential for job creation and economic development. Proposals or consortia that combine and coordinate related research at two or more colleges and universities shall be encouraged.

(5) The State Advisory Council on Science and Technology shall review the activities and progress of individual centers on a regular basis and assist the division in preparing an annual report on the accomplishments and direction of the Centers of Excellence Program.

History: C. 1953, 63-62-3, enacted by L. 1986, ch. 109, § 3; renumbered by L. 1992, ch. 241, § 62.

Repeals and Reenactments. - Laws 1986, ch. 109, § 3 repealed former § 63-62-3, as enacted by L. 1953, ch. 103, § 3, relating to creation of a committee for technology excellence in engineering research, and enacted the above section.